

The invention relates to a pressure and/or a coining machine for printing on and/or. Beprägen of hollow bodies such as cans, tubes od.dgl., with a conveyor, which can be worked on the hollow bodies successively of a filling station in a pressure and/or. Embossing station transported, whereby the hollow bodies on disposed spindles rotatable at the conveyor around their longitudinal axis verdröhrest supported are.

Such apparatuses serve the outer surface of containers for continuous printing on and/or. Hollow bodies such as cans, tubes od.dgl. The conveyor is frequent as gun plates formed distributed disposed at which the spindles are in circumferential direction, on which in the filling station the hollow bodies is drawn up. The rotate-fixed fixation on the spindles made usually with the help of a vacuum system. After an hollow body is into the print station conveyed, it runs off there with its outer surface at the pressure surface of a rotary printing roll or a piston ram, whereby a color transfer takes place.

This system of prepared no problems, as long as it concerns the Erstbedruck of an hollow body, whose relative position on the hollow body wall, seen in circumferential direction, unimportant. As soon as however printing on with a certain orientation has to take place in circumferential direction, difficulties result to adjust the layer exact. So far one has frequent stepper motors or clutch brake combinations used, with whose assistance a manual positioning became each single spindle performed. This guided however to inaccuracies in the adjustment, so that single print images frequent overlap themselves inadvertently, which undesirable is. Beyond that the adjustment of the single spindles requires and/or. Hollow body tremendous time, so that an only small working speed becomes achieved.

It is therefore the object of the invention to create an apparatus in accordance with that initially mentioned type it the permitted, multiple printing operations and/or. oriented pressure and/or. To accomplish embossing procedures substantial rapid and in particular automated, whereby besides an high pressure and/or. Embossing accuracy regarding the orientation on the hollow body outer surface achieved becomes.

This object becomes achieved thereby that a reading device is present, before printing on and/or. Coins/shapes the trick and/or. Winkelage of a respective hollow body on the basis at least a trade name detected disposed to the fact that this hollow body the supporting spindle at least during the durations of the reading operation and itself the subsequent subsequent pressure and/or. Embossing procedure in the pressure and/or. Embossing station a permanent rotary drive for continuous, slip-free rotation associated is, and that the rotary drive a control device is associated, those in dependence of the actual layer of the respective hollow body this detected by the reading device in desired target trick and/or. - Winkelage corrected, by it a corresponding change of the spindle rotational speed caused, and subsequent and/or simultaneous for the observance the one for the pressure and/or. Embossing procedure required pressure and/or. Embossing speed ensures.

Now leaves themselves also pressure and/or. Embossing work accomplish, which is to be arranged egg of hollow body with exact orientation concerning the circumferential direction. During their transport arrive on the spindles and/or. Mandrels disposed sleeve body after leaving the filling station into the work area of a reading device, whereby they become simultaneous coupled with the rotary drive, which propels them into a continuous rotational movement around their longitudinal axis. The drive made in a reading speed, which is preferably smaller than itself the late subsequent speed during a pressure and/or. Embossing procedure. In runnings of the rotational movement of the respective sleeve body the registered reading device on the basis a hollow body mark the trick and/or. Winkelage of the hollow body, which announces it to the control device. This so called actual layer compares the control device with an entered target layer, those by the speeds and orientations of the pressure and/or. Form die impacts predetermined is. Then a made corresponding situation correction by an increase of the spindle number of revolutions, caused by corresponding drive of the rotary drive on the part of the control device. The situation correction is made, or however already last to the execution of this situation layer, made then further an adjustment of the spindle rotational speed in such a manner that it to the ratios in the pressure and/or. Embossing station adapted is. Thus for example if a rotary printing roll is present in the print station, then the rotary drive receives the instruction over the control device to adjust and keep the Spindelgeschwindigkeit that the rotational speed of the pressure roller surface and the case body surface same are. Since before already the situation correction took place, with the fact ensured is that the print image exact in the desired extent place of the hollow and/or. Sleeve body sets. There the pivotal connection between the rotary drive and the respective spindle favourable-proves slip-free made, is an high precision of position control also with high working speeds ensured. It is not therefore any longer required that the hollow bodies become temporary in its rotational movement stopped, around an exact alignment to obtained. The entire operation can take place flowing, what an high throughput permitted.

Favourable developments of the invention are in the Unteransprüchen listed.

The development according to claim 3 a permitted exact detection of the actual angle situation of the respective hollow body.

With the developments in accordance with the claims 4 and 5 the reading device can become to the circumstances of the respective kind of hollow body adapted. As trade name for the read body can in particular wolds or already present pressure and/or. Embossing pictures used become, so that additional marks are not required.

With the development according to claim 6 is a reliable reference given, and it is beyond that possible to give with a required displacement of the print image on the hollow body an additional angle disalignment. This can take place for example via a digital angle input.

The development in accordance with the claims 8 and 9 a permitted again increased working speed of the apparatus, since no Förderpausen are required on the part of the conveyor. In order not to impair the read accuracy of the reading device, this here becomes far along-moved on the basis of an initial position with the respective spindle a piece, until the read mark is detected, according to which the reading device returns to its initial position.

The development according to claim 10 a permitted compact formation of the rotary drive, whereby favourable-proves per time unit only very few of the present spindles with the rotary drive coupled are.

With the developments in accordance with the claims 12 to 15 made during operation of the conveyor successively an automatic engage of the single driving off hurry of the spindles into the respective continuous drive strand. Also the

decoupling made automatic, by the conveyor drive off-hurry from the drive strand moved away. Aufwen mechanical couplings are unnecessary therefore. It is more other favourably that the continuous drive strand permanent with a certain ground speed can rotate, which preferably corresponds to the Schwenkgeschwindigkeit of the turret, so that a problem-free coupling of the spindles can take place and the simultaneous coupled spindle becomes accelerated on the reading speed. Time-consuming acceleration processes for starting the continuous drive strand are unnecessary therefore.

With the development according to claim 16 the working speed again considerable increased can become, there favourable-proves during printing an hollow body on the situation correction and/or acceleration on pressure number of revolutions of a subsequent spindle to already take place can. The development according to claim 17 describes a simple and verschleisslesten rotary drive for the independent drive of two spindles.

The developments in accordance with the claims 18 and 19 describe spindles with compact, simple construction.

The developments in accordance with the claims 20 and 21 facilitate the work of the control device.

The development according to claim 23 a permitted simple matching of the apparatus to various hollow body diameters.

The invention becomes subsequent explained near on the basis the accompanying drawing. In this show.

Fig. 1 a front view of a first configuration of the apparatus according to invention, which is formed as printing apparatus, in schematic illustration,

Fig. 2 a plan view on the apparatus from Fig. 1, likewise in schematic illustration,

Fig. 3 a cutout of an other embodiment of the apparatus according to invention, likewise in front view and strong schematizes,

Fig. 4 a longitudinal sectional view by a favourable embodiment of a spindle supported at a gun plate and

Fig. 5 in perspective view a clarity of the drive connection of two endless of drive strands of a rotary drive with two spindles.

The invention is first on the basis in the Fig. 1 and 2 of imaged embodiment to be clarified, with which it concerns a printing press. The invention is not however limited on printing presses, also with corresponding working embossing machines od.dgl. she can find to use favourably.

The apparatus in accordance with Fig. a machine frame 1, that contains 1 and 2 at its front side a conveyor 2 in shape of a rotatable stored trick and/or. Gun plate exhibits 3. At the backside of the turntable 3 a drive motor 5, with which the turntable 3 is more drivable around its longitudinal axis 4 to a rotational movement in accordance with arrow 6, is the made gradual with the embodiment in the frame 1. At the turntable 3 a plurality cylindrical spindles 7 at the outside marginal area, which are in circumferential direction of the turntable 3 with distance distributed disposed to each other, is, so that an endless spindle row adjusts itself. A plug apparatus 8 of the spindles 7 rises up over the plate front side forwards, whereby the longitudinal axes 9 of the spindles parallel to the rotation axis 4 run.

In the frame of the rotational movement of the turntable 3 the spindles go through 7 successively several work stations. In detail it concerns here an only schematic suggested filling station 10 lateral beside the turntable, in an actual known manner the hollow bodies 11 which can be printed on, e.g. Cans or tubes od.dgl., to the plug apparatus 8 of the associated in each case spindle 7 to be attached. Furthermore a print station is 14, preferably at the top of the machine, present, in which the hollow body 11 seated on the spindles printed become. In arrow direction 6 then an unloading station 15, with the embodiment of the filling station opposite, follows in which the printed hollow bodies 11 by the plug apparatuses 8 removed are removed and to the other use. Also the discharger 15 is only schematic indicated.

The use of a trick and/or. Gun plate an high stability and a permitted compact construction of the apparatus, which from particular advantage is, lends 3 as conveyor 2 to the spindle arrangement.

On their path between the filling station 10 and the unloading station 15 the hollow bodies 11 are unverdrehbar and in axial direction non-relocatable on the plug apparatuses 8 fixed, which in particular over a vacuum becomes suction system accomplished, which can be in actual known manner formed. Is exemplary only also on Fig. 4 referred, according to which the single spindles 7 contain on the inside an axial channel 17, that in accordance with Fig. 1 at the front side of the respective plug apparatus out-flows (with 18) and over an other channel system the 19 with a not represented suction device is more connectable.

The spindles 7 are free rotatable at the conveyor journaled, by being in a bearing sleeve used into the turntable 3 20 received, that opposite them itself by means of rolling and/or. 13 both in radial direction and in axial direction for ball bearings support (see. Fig. 4). In all other respects each spindle consists preferably of two units, first, late still to explanatory drive unit 21 and the already mentioned plug apparatus 8, those supernatant at the plate front side with a putting in shank 22 releasable rested in a receiving opening of the drive unit 21 coaxial in-sat and in the case of need, z. B. with alternate hollow body diameters, easy and rapid is more interchangeable.

In the print station 14 is the disposed there in each case plug apparatus 8 an opposite printing roll 23 provided with parallel rotation axis, whose subsequent outer surface a negative one designated as print on-flat 24 contains of the desired print image. Them become over a pressure engine 25 or driven over a mechanical intermediate gear of the drive motor 5 a rotational movement. The association of the conveyor 2 to the print station 14 made in such a manner that in each case the hollow bodies 11 with its outer peripheral surface 30 at the print on-flat 24 located in the print station 14 to the plant comes and takes over in the frame of the rotational movement of the printing roll 23 their print image.

With the apparatus according to invention it is possible in such a way to print on the hollow bodies 11 that the print image takes an exact predetermined layer concerning the circumferential direction of the sleeve body 11. For this purpose first a reading device is 31 present, which contains a read head 32, which is in conveying direction 6 seen lateral beside the conveyor track of the spindles 7 disposed. With the embodiment in accordance with Fig. 1 sits the head 32 at an extension 33, which is at the fixed hub portion 34 of the turntable 3 fixed. The reading device 31 takes up its operation before printing a respective hollow body 11 on and preferably is in a reading station 35 disposed between the filling station 15

and the printing on station 14.

With the embodiment in accordance with Fig. 1 and 2 the conveyor 2 works cyclically, so that the spindles become gradual 7 together with the respective hollow body 11 between the single stations transferred, so that during a subsequent still to explanatory reading operation one Förderpause occurs, so that the respective 35 hollow bodies located in the reading station 11 with reference to the rotating direction 6 in rest is brief.

During the Förderpause the orientation of the hollow body 11 found located in the reading station 35 becomes over the reading device 31, by its trick and/or. Winkellage with reference to the spindle longitudinal axis 9 found becomes. With the embodiment for this the read head is 32 formed as optical reading device, those on an already present printing 36 on of the hollow body 11 responsive. Therefore is not favourable-proves required that extra for the reading operation becomes a mark on the hollow bodies mounted. In all other respects the reading device from case is to case in dependence of the embodiment and/or. Material condition of the hollow bodies formed and can exhibit for example a read head with mechanical scanning devices or however with inductive, capacitive or ultrasonic sensors. When hollow body markings can, as with the embodiment, preferably already present print images or welds od.dgl. serve.

The reading operation becomes supported by a rotary drive 37, that the spindle 7 min associated located in the reading station is and these in rotation staggered, so that also the supported hollow bodies a rotational movement implements 11. This rotational movement covers an angle of rotation of 360 DEG during remaining in the reading station preferably at least, so that the read head can scan the entire outer surface of the hollow body 11, so that the Winkellage can become precise found.

The drive of the spindle 7 min made with an exact measured speed, located in the reading station 35. One in Fig. is able 2 only schematic suggested control device 38 then to determine by comparison of this speed with the speed of the printing roll 23 and their relative Winkellage opposite the machine exact by which angle the detected actual layer of the hollow body deviates opposite the desired target layer, which is 23 predetermined by the arrangement of the pressure negative on the printing roll. Comparison values of the printing device supply a tachometer 39 and a pulse generator 40, which are 25 coupled to the pressure engine and with the control device 38 over only schematic suggested control lines 41 in connection, as this is also with the read head 32 over a control line 41 min the case.

The spindle 7 min coupled in the reading station 35 with the rotary drive 37 maintains this coupling, both during the subsequent other promotion to the print station 14 and during the actual printing operation. The drive connection is here preferably slip-free, so that after the detection of the Winkellage of an hollow body no uncontrolled situation shifts can take place more.

Now if the Winkellage of an hollow body is found, which with comparatively low rotational speed made, to increase or degrade the so caused control device 38 the rotary drive 37 to change the rotational speed in such a way i.e., until the detected actual value agrees with the desired value. For this the drive unit becomes 44 of the rotary drive 37 over control lines 41 min in corresponding manner driven. Favourable way becomes the actual value in the control device stored, so that the situation correction can take place also during a promotion act on that paths of the hollow body to the print station 14.

The drive unit 44 possesses with the embodiment from late still to explanatory reasons two drive motors 45, 45 min, in each case with a tachometer and/or. Tachometers 46, 46 min and for the angular position responsible pulse generator 47, 47 min equipped are, so that the data required for a situation correction the order provided to become problem-free to be able.

If the situation correction is made, a so made other change of the spindle number of revolutions by influencing the control device 38 on the rotary drive 37, until the spindle receives a rotational speed, in which the outer circumference speed of the fixed hollow body with the peripheral speed of the printing roll 23 agrees. It understands itself that the situation correction and the matching of the speed can take place also in the frame of an overlaying procedure.

Anyhow is now ensured that for the moment the contact between from the reading station 35 14 hollow bodies spent into the print station and the printing roll 23 are both the Winkellage and the rotational speed of the hollow body 11 23 tuned exact on the corresponding ratios on the part of the printing roll. Thus one receives an exact positioned, sharp and unverwischtes print image.

The single spindles 7 stand thus during their conveying path between their for the reading device associated position and the pressure and/or. Embossing station as well as during the reading time and the pressure and/or. Embossing duration continuous in drive connection with the rotary drive 37, during it other 6 on their conveying path between the print station 14 seen in conveying direction and the reading station 35 of the rotary drive 37 separated and/or. disconnected are. That a clear boundary cannot become pulled, the coupling with the rotary drive understands itself can also already short before the arrival in the reading station begin and only to short after the exit from the print station 14 end.

In order to obtain an high working speed of the apparatus, provided is with the embodiment favourable-proves that in each case two 6 successive disposed spindles 7 simultaneous in drive connection with the rotary drive 37 seen at the conveyor 2 in conveying direction can stand. A spindle 7 min required into the reading station 35 already then already is in drive connection with the rotary drive 37, if the preceding spindle 7 min min is still in the print station 14. The rotational speed of the two spindles complete is independently more controllable, so that practical can always take place a reading and a printing operation from each other uncoupled parallel.

For this purpose the rotary drive 37 provided with two endless drive strands 48, 48 min is, which are in each case one of the mentioned already above drive motors 45, 45 min drive-laterally associated. It concerns here endless circumferential toothed belts 48, 48 min, which are provided out still to explanatory reasons with a teeth 49, 49 min. Everyone of the two strands 48, 48 min is around a drive wheel 50, 50 min one of the drive motors 45, 45 min as well as around other two free rotatable deflection rollers 51, 51 min linkable at the frame 1 and/or. 52, 52 min bolted, whereby teeth 49 min with corresponding extent teeth of the wheels, pointing to the Trum inside, and/or. Rollers kämmt. The two drive strands 48, 48 min run in to each other parallel planes next to each other, whereby the two to each other parallel strand-planar and/or. Rotatingplanar 53, 53 min rectangular to the spindle axes of rotation 8 runs. In place of the toothed belt also a

same acting connection selected can become, prerequisite is however a slip-free drive contact between the drive strand and the single wheels.

In axial direction 4 seen here essentially are the two drive strands 48, 48 min in the area of the backside of the turntable 3 and above beside the turntable. Bottom reference on Fig. 4 the drive unit 21 of the spindles 7 rises up over the backside 54 of the turntable 3 before and carries two 8 next to each other disposed wheels 55, 56 coaxial in axial direction. The outside wheel 56 of each spindle 7 lies in the plane continuous promotion rank 48 min, while the inner, the turntable 3 directed wheel 55 in the plane of the second drive strand 48 runs.

The drive wheels and/or. Deflection rollers of the drive strands are like that disposed at the machine that one between two of the rollers and/or. Wheels 50, 50 min and/or. 52, 52 min disposed drive Trume 57, 57 min in the conveying path 58 of the spindles 7 over a certain path, circular with the embodiment, intervenes. With the embodiment therefore the drive Trume 57, 57 min a piece is far essentially in circumferential direction 6 of the turntable 3 shifted, whereby her with their outside teeth 49 on the wheels 55 and/or. 56 of the two simultaneous in the reading station 35 and the print station 14 located spindles 7 min, 7 min min runs. The drive Trum 57, 57 min, which would cut the viewed turntable 3 in kind of a secant oblique without the spindles 7 min, 7 min min, therefore receives by the engagement of the wheels 55, 56 at two locations a kink.

Substantial one is further that one of the two wheels 55, 56 of each spindle 7 is as unsolicited returning wheel and the other one than with then drawing up shank the formed plug apparatus 8 in turnringlike connection standing output gear 63 formed in each case. Fig. a spindle shows 4, with which the inner wheel 55 forms the returning wheel 62, which is 21 free rotatably mounted over a rolling bearing 64 on the formed drift shank 65 of the drive unit hollow to the uptake of the putting in shank 22. Furthermore the outside wheel 56 forms the output gear 63 and stands over a wedge connection 66 in rotate-fixed connection with the drift shank 65. Die conveyor 2 carries an even number of spindles 7, whereby the output gear 63 and the returning wheel 62 6 successive in each case spindles 7 in conveying direction are exchanged regarding the planar described axial position, so that the output gear 63 of a spindle 7 min is in a common, rectangular radial plane 53 min with the returning wheel 62 of an adjacent spindle 7 min min disposed, disposed to the spindle axis of rotation 8, and reverse. The output gear 63 is provided with a teeth appropriate to the drive strand in each case, while the returning wheel does not require a teeth.

The operation is now the subsequent:

Driven by the two drive motors 45, 45 min rotates the two drive strands 48, 48 min permanent. Arrived now a spindle 7 min into the reading station 35, then the output gear 63 in the associated toothed belts combs in, so that the spindle and/or. the supported hollow bodies 11 in rotation staggered becomes. Simultaneous one fits also the other toothed belt at the returning wheel 62, is however because of its freewheel without influence. After the end of the reading operation and the mentioned already above, 38 situation released by the signalling device and/or. Number of revolutions corrections the turntable 3 other-clocked becomes, until the spindle 7 min takes the position 7 min min in the print station 14. The drive connection with the associated toothed belt remains here continuous obtained. During the rotational movement of the turntable 3 then the subsequent spindle seen in conveying direction 6 arrives into the area of the reading station, whereby of them arrives to staggered output gear 63 with the second toothed belt in axial direction in engagement. The first spindle 7 min min further propelling toothed belts does not rest here against the returning wheel 62 of this subsequent spindle and influenced these therefore. If the spindle 7 min min is provoked now from the print station 14, then both wheels 55, 56 arrive except engagement with the toothed belts, while the subsequent spindle arrives now to corresponding into the print station 14. With the transport of the spindles in circumferential direction 6 thus successive spindles alternate in each case arrive to other continuous drive strand in drive connection with or 48, 48 min. The operations therefore overlap, which brings a significant time saving opposite a simpler embodiment with itself, with which only a drive strand provided are. It understands itself that in the case of need also more than two drive strands independently used to become to be able, whereby then corresponding more wheels at the spindles are to be planned 7. It understands itself that with the situation correction of the single spindles released by the control device 38 also the relative motion considered becomes, those between the single output gears 63 and the drive strands 48, 48 min standing with them in drive connection takes place, if the conveyor becomes other-clocked.

Fig. 5 again min points, like it alternate in drive connection with two spindles 7 min and/or to the clarity in schematic illustration one cutout of the drive strands 48, 48, 7 min min stands. Same components are provided with corresponding reference numerals as with the other figs.

It understands itself that the control device 38 the evaluation also the respective engine data of the drive motor become 5 2 supplied for the conveyor; in Fig. 2 is corresponding control lines 41 min min min broken shown.

With in Fig. 3 imaged execution variant the used numerals were re-used with corresponding components. This embodiment differs from the prior by the fact that the conveyor 2 continuous works, i.e. that the turntable 3 implements a continuous rotational movement around its longitudinal axis 4. In order to give to the reading device 31 nevertheless sufficient time to recognize the Winkellage of a moved by hollow body 11 them become at least 7 constant along-moved during the reading operation with the hollow body which can be seized 11 supporting spindle and after completion of the procedure into the initial position back-displaced. With use of a turntable 3 as in the embodiment it is favourable to arrange the reading device 31 at a pivotal arm 67 which is pivotable journaled in the area of the rotation axis 4 of the turntable 3 and which is an only broken represented vane drive 68 associated. During the Mitbewegens with one hollow body 11 which can be seized will the pivotal arm 67 the corresponding rotational speed promote here- DP N=21> mechanism 2 along-pivoted and becomes after completion of the reading operation again into the starting position back-pivoted. In Fig. 3 is the starting position of the reading device 31 in solid lines imaged, while various swiveling positions are broken imaged, which the mechanism can take with and Herverschwenken in accordance with double arrow 69 for example.

With this embodiment a stationary print head with a pressing plate is 70 disposed at which that shifts itself hollow bodies 11 which can be printed on in each case during the printing operation, however always guided of the rotary drive 37 and/or in the print station 14 in place of a printing roll. one of the two drive strands 48, 48 min. Since the pressing plate is 70 planar, 3 mechanisms are 71 provided, those to the balance of the circulation of the spindles 7 along arrow 6 a

superposed, in particular radial movement permit at the turntable, so that the contact goes to the pressing plate 70 not lost (schematic indicated).